

IN THE MATTER of response to U.S. Examiner
(Jack Yip) re rejection of April 24,
2008, of U.S. Patent Appn No.
10/519,740 in the name of
Canterbury District Health Board
Title: Symbols-scanning test and
symbols-and-tracking dual-task
test
Inventors: Richard D Jones,
Anthony S. Pollock

AFFIDAVIT OF Richard Darryl JONES

Sworn: 18 August 2008

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CHRISTCHURCH

AFFIDAVIT OF Richard Darryl JONES

I, Richard Darryl JONES, of Christchurch, New Zealand, swear as follows:-

My Background

1. I have B.E.(Hons) and M.E. degrees in Electrical & Electronic Engineering from the University of Canterbury, Christchurch, New Zealand, in 1974 and 1975 respectively and a Ph.D. in Medicine from the University of Otago, Christchurch, in 1987. I am a neuroengineer & neuroscientist, Director of the Christchurch Neurotechnology Research Programme (www.neurotech.org.nz), a senior biomedical engineer in Department of Medical Physics & Bioengineering of Canterbury District Health Board, an Honorary Research Associate Professor in the Department of Medicine at the University of Otago, Christchurch (www.chmeds.ac.nz/departments/medicine/richard_jones.htm), and Adjunct Associate Professor in the Department of Electrical & Computer Engineering (www.elec.canterbury.ac.nz/people/jones.shtml) and Department of Communication Disorders at the University of Canterbury.

2. MY research interests, expertise, and contributions fall primarily in neural engineering and the neurosciences, and particularly in the field of human performance engineering encompassing the development and application of computerized tests for quantification of upper-limb sensory-motor and cognitive function, particularly in brain disorders (stroke, Parkinson's disease, traumatic brain injury) and driver assessment. This has led to a substantial number of publications in international refereed journals (see CV) and a chapter, now in its 3rd edition, on 'tracking tasks' (an important component of U.S. patent application 10/519,740) in the world's pre-eminent textbook on biomedical engineering (The Biomedical Handbook, CRC Press, 2006).

3. I am a Fellow of the Institution of Professional Engineers New Zealand, a Fellow and a Past President of the Australasian College of Physical Scientists and Engineers in Medicine, a Fellow of American Institution for Medical and Biological Engineering, a Fellow of the Institute of Physics (UK), and a Senior Member of the Institute of Electrical & Electronic Engineers (IEEE). I have been a member of most of the IEEE Engineering in Medicine & Biology Society's International Conference Committees since 1988, a past member of its Administrative Committee (representative for Asia-Pacific region), Co-Chair of Neural Engineering Theme at EMBC 2005, and am a Co-Chair of 'Neural Engineering, Neuromuscular Systems, & Rehabilitation Engineering' Theme at EMBC 2008 in Vancouver. I am also an Associate Editor of *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, a member of the Editorial Board of *Journal of Neural Engineering*, a Theme Editor on the EMBS Conference Editorial Board, and a past Associate Editor of *IEEE Transactions on Biomedical Engineering*.

4. PLEASE refer to my curriculum vitae (attached as **Appendix A**) for full details on qualifications, positions held, refereed publications, positions held in professional organisations, etc..

Background to Invention

5. FROM the mid-1970s, I have (amongst other endeavours) been developing and applying a battery of sensory-motor and cognitive tests (*SMCTests™*), comprising tests of visuospatial function, visuoperception, ballistic movement, tracking, reaction times, divided attention decision-making, visual search, complex attention, impulse control, and planning. The sensory-motor tests have been used (1) as a clinical tool to detect and quantify sensory-motor deficits in off-road driving assessment and as a research tool to detect/quantify

deficits in persons with unilateral stroke, Parkinson's disease, traumatic brain injury, and developmental stuttering, (2) to determine the effects of alcohol, time of day, age, gender, handedness, and dimensionality on sensory-motor performance, (3) to investigate the characteristics and detection of microsleeps during sustained attention tasks, and (4) validate computational models of the brain.

6. ONE of the key tests in *SMCTests* is that of 'Divided Attention'. This actually comprises 3 separate but related sub-tests/tasks:

- Test A – 'Arrows perception' - Fig. 1 - Page 4, line 20 - Page 5, line 25.
- Test B – 'Random preview tracking' - Fig. 2 - Page 6, lines 4-24.
- Test C – 'Dual-task', in which Tests A and B are carried out simultaneously → a specific formulation of Symbols-and-tracking dual-task test in Application 10/519,740.

7. THE Divided Attention test was invented as a means of quantitatively determining (1) the extent to which a person could perform two demanding tests simultaneously, both involving visual stimuli and motor responses, and (2) the extent to which performance on the two component tasks deteriorated relative to that when the tasks were carried out on their own (see Page 7, line 10 - page 8 line 15).

Novelty/Non-Obviousness of Invention

8. TEST C is unequivocally novel, with no parallel in the scientific or patent literature.

9. THE Examiner considers that U.S. Patent Application No. 10/519,740 should be rejected in the light of a combination of three prior publications:

- U.S. 5,131,848 (Adams, 1992) – 'Testing method and apparatus'
- U.S. 5,269,687 (Mott, 1993) – 'System and method for recursive driver

training'

- U.S. 5,660,547 (Copperman, 1997) – 'Scenario development for vehicle simulators'

10. AS I see it, the primary ground put forward for rejection of our application is that "it would have been obvious to one of ordinary skill in the art to modify the simulated driving track described by Mott, by providing randomly scattered objects as taught by Adams" and "... by providing a measured reaction time as taught by Adams".

11. I strongly contend this is incorrect and that it was never, and still isn't, obvious to combine Mott (or Copperman) with Adams. My grounds for this are:

a. The patents of both Mott and Copperman describe driving simulators. In contrast, Test B 'Random preview tracking' is not a driving simulator and is critically different from a driving simulator. A driving simulator aims, of course, aims to simulate the complex real-world driving environment, whereas Test B is a specific and highly sensitive test of visual-motor coordination, which has proven an invaluable tool in multiple research studies unrelated to driving. I believe that the Examiner's comments on both Mott and Copperman tend to overlook the fact that these patents relate to driving simulators and driving training systems. In the Examiner's discussion of Mott in section 6, paragraph b he asserts that Mott presents on the screen a plurality of first symbols scattered over the screen. Certainly, both Mott and Copperman present symbols on the screen but these are not "scattered" in any normal sense:- they are symbols showing various characteristics of the course being driven on the simulator. In my claim 1, this feature is emphasized because I say "a plurality of first symbols randomly and widely scattered over said screen". In neither Mott nor Copperman could the symbols be said to be randomly and widely scattered:- the symbols in Mott and Copperman are placed on

the screen in a logical position to represent a real-world type scenario for somebody training as a driver:- the symbols are logically positioned otherwise they would be meaningless and the driver training would be completely unreal and ineffective.

The Examiner goes on to assert that Mott teaches that there can be different objects. This is correct, but, again, these objects are never randomly scattered.

In section 6, paragraph c, the Examiner notes that Mott at column 7, lines 30-55, requires a test subject to identify one or more pre-selected characteristics of the first symbols while simultaneously requiring the test subject to steer the controllable symbol along the varying route. I have studied the cited passage carefully, but I cannot find any requirement for a driver using the Mott system to identify one or more pre-selected characteristics of the symbols, except in the sense that the driver is of course required to react to any messages displayed or take appropriate evasive action if an obstruction is displayed. I agree that in claim 1, as presently worded, it is perhaps not clear that the test subject is required to give a pre-selected type of response (generally a verbal response, but it could be a mechanical action (see page 5, lines 1-14)). However, when the dual task test is being undertaken (see page 7, line 5 onwards) in my invention there is no suggestion whatsoever that the test subject be required to alter the tracking portion of the test in response to the symbols displayed. In fact the converse is true:- the test unequivocally becomes a dual task in which the subject is required to react appropriately to the symbols whilst continuing to perform the tracking test to the best of their ability. This is the important difference between my invention and those of Mott and Copperman in which a driver in a realistic driving simulation must react to hazards or signs or other instructions or to other vehicles on the road while driving their own vehicle - they must integrate any information

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given by symbols, hazards etc displayed on the screen into their driving task. In contrast, in my invention the test subject is being tested on the ability to divide (cf. switch) their attention and carry out two tasks simultaneously - i.e. 'dual task'.

b. The patents of both Mott and Copperman describe systems for driving training. In contrast, Test B (and, hence, Tests A and C) are aimed at identifying and quantifying executive dysfunction/deficits in the brain due to brain disorders, which substantially lower a person's ability to divide attention and resources between two simultaneous tasks.

c. There is a similarity between Adam's test and "Symbols-scanning test" (= Test A 'Arrows perception') and, therefore, on its own, the "Symbols-scanning test" is not considered claimable, despite it being substantially different to Adam's test.

In contrast, our "Symbols-and-tracking dual-task test" bears no relation to the systems/tests of Mott and Copperman.

d. Importantly, it is neither obvious nor logical to combine Adam's test to the driving simulators of Mott and Copperman. Doing so would detract severely from the face validity of a driving simulation system, by rendering the system unrealistic. This is why neither Mott nor Copperman (who, of all people, could be considered to have "ordinary skill in the art") did so in their respective patents. Likewise, no one else has done so because there is no rationale for adding symbols-scanning or Adam-type tests to driving simulators.

In addition, I contend:

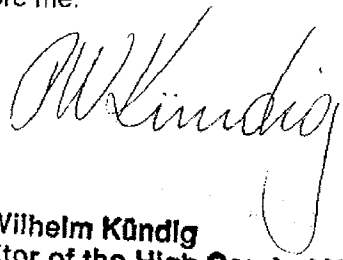
e. "Symbols-and-tracking dual-task test" (Test C) can unequivocally be claimed as novel on its own but its value is further enhanced when used in combination with Tests A and B. By having a subject perform Tests A and B prior to Test C, one can obtain additional important information on deterioration of performance when two tasks carried out independently have to be carried out simultaneously.

f. Mott, Copperman, and Adams are all specific to driving. While our tests can be, and are, used in relation to the driving task, they can also be applied in applications unrelated to driving, especially in research of deficits in brain function in various brain disorders.

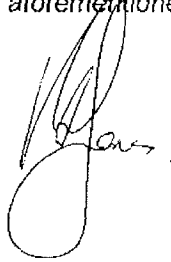
Summary

I consider that our U.S. Patent Application No. 10/519,740 is novel and further is not an obvious combination of any of the cited prior art. I respectfully request that this application be reconsidered in light of the *aforementioned* points.

SWORN at Christchurch, New Zealand,
this 18 August 2008
before me:



Paulo Wilhelm Kündig
A Solicitor of the High Court of New Zealand
Christchurch, New Zealand



CURRICULUM VITAE

Richard D. Jones

July 2008

1. Personal Information

Name: Richard Darryl Jones
Address: 4 Hurst Seager Lane, Christchurch 8, New Zealand
Date of Birth: 22 May 1951
Place of Birth: Invercargill, New Zealand
Marital Status: Married to Christina, 16 January 1975
Children - Michael (dob 29 July 1983), Callum (dob 8 March 1991)

2. Qualifications

BE (Elect) University of Canterbury 1973 (Hons – 2nd Class, Div 1)
ME (Elect) University of Canterbury 1975
PhD (Medicine) University of Otago 1987

3. Professional Affiliations/Memberships

Member of Australasian College of Physical Scientists and Engineers in Medicine (MACPSEM), 1979
Registered Engineer, New Zealand, 1983
Member of Institution of Professional Engineers, New Zealand (MIPENZ), 1983
Member of Institution of Electrical and Electronic Engineers (MIEEE), 1987
Senior Member of Institution of Electrical and Electronic Engineers (SMIEEE), 1990
Fellow of Australasian College of Physical Scientists and Engineers in Medicine (FACPSEM), 1995
Fellow of Institution of Professional Engineers, New Zealand (FIPENZ), 1999

Fellow of American Institution for Medical and Biological Engineering (FAIMBE), 2003

Fellow of Institute of Physics (UK) (FInstP), 2004

4. Languages

English

5. Employment History

(a) Present Position

Member of Assembly of Faculty of Medicine, Christchurch School of Medicine, University of Otago, Christchurch, 1989-present.

Director, Christchurch Neurotechnology Research Programme, Canterbury District Health Board, 2001-present.

Adjunct Associate Professor, Department of Electrical & Computer Engineering, University of Canterbury, Christchurch, 2003-present.

Honorary Research Associate Professor, Department of Medicine, University of Otago, Christchurch, 2007-present.

Manager, Neurosciences Section & Senior Biomedical Engineer
Department of Medical Physics and Bioengineering
Christchurch Hospital, 2008-present.

Adjunct Associate Professor, Department of Communication Disorders, University of Canterbury, Christchurch, 2008-present.

(b) Employment History

Biomedical Engineer, Department of Medical Physics and Bioengineering, Christchurch Hospital, Canterbury District Health Board, Christchurch, New Zealand, 1975-2008

Manager, Diagnostic Physics & Bioengineering Section, Department of Medical Physics and Bioengineering, Canterbury District Health Board, 1988-2002.

Honorary Fellow [adjunct], Department of Medicine, Christchurch School of Medicine, University of Otago, Christchurch, 1997-2001.

Senior Fellow [adjunct], Department of Electrical & Electronic Engineering, University of Canterbury, Christchurch, 1999-2002.

Chair, Executive Management Team, Van der Veer Institute for Parkinson's and Brain Research, Christchurch, 2004-2006.

Manager, Diagnostic Physics & Bioengineering Section, Department of Medical Physics and Bioengineering, Canterbury District Health Board, 1988-2002.

Research Associate Professor [0.2 FTE], Department of Medicine, Christchurch School of Medicine, University of Otago, Christchurch, 2001-2007.

Research Director, Brain Research Division, Van der Veer Institute for Parkinson's and Brain Research, 2006-2008.

6. Other Relevant Experience

(a) Experience Working in an Overseas Country (not previously listed)

Australia, Research sabbatical at Spastic Centre Research Unit at Prince Henry Hospital & University of New South Wales, 1992-1993.

(b) National/International Collaboration

Australia, University of New South Wales (Department of Systems and Control), Research collaboration with Assoc Prof Peter Neilson, Computational modelling of the human motor control system: Adaptive Model Theory, 1998-2002.

The Netherlands, University of Twente (Electrical & Electronic Engineering), Co-supervision of Maarten-Jan Hoeve (Practical training & Masters thesis), Automated detection of epileptic activity in the EEG, 2000-2003.

Wellington, Massey University (Sleep/Wake Research Centre), Research collaboration with Dr Leigh Signal, Associate Director, Lapsing and EEG, 1999-present.

7. Research Activities

(a) Research Expertise

Research –

1. Human performance engineering and neuroscience – Development of computerized tests and techniques for quantification and fractionation of upper-limb sensory-motor function; Application to assessment and study of brain disorders (stroke, Parkinson's disease, stuttering, traumatic brain injury), factors affecting normal sensory-motor function (age, gender, laterality, alcohol, time-of-day, 2-D versus 1-D), off-road driving assessment & prediction, and lapses in responsiveness (microsleeps, sustained attention).
2. Drowsiness and lapse detection from behavioural measures (tracking and video metrics) and electrophysiological signals (EEG, EOG).
3. Signal processing in clinical neurophysiology – Multi-channel EEG analysis for detection of ictal and interictal epileptic activity, spectral topography, and real-time long-term EEG monitoring.
4. Eye movements in brain disorders (Parkinson's disease, traumatic brain injury).
5. Computational modelling of the human brain in relation to purposive movements.
6. Virtual-reality approaches to neurorehabilitation.
7. Neural control of swallowing and breathing-swallowing coordination.

Research leadership: Generation of collaborative research programmes –

1. **Christchurch Brain Research Group** – A considerable factor in the success and productivity of my research work and initiatives can be attributed to (a) strong collaborative linkages with academic staff in UO (Medicine) and UC (ECE and Psychology) and (b) the attraction of and contributions from top-level postgraduate students for projects in neuroengineering and neurosciences. In 1998 these collaborations and activities led to the formation of the *Christchurch Brain Research Group* (CBRG) in recognition of, and to provide a greater focus on and support for, the substantial and expanding research & development in Christchurch relating to the human brain and its disorders. I was an inaugural Executive member and Secretary of this Group, was largely responsible for getting the Group's procedures, documentation, and website established, and was its Chair and Administrator from 2001. In Sept 2004 the roles of the Group were, as planned, formally handed over to the Van der Veer Institute (see below), with the Group's 88 members all becoming members of the Institute.
2. **Christchurch Neurotechnology Research Programme** (www.neurotech.org.nz) – The Neurotechnology Programme was formally established in early 2001 following success in obtaining a contract research grant from the Foundation for Research, Science & Technology. The primary aim of the funding is to substantially enhance the base and outputs of a major collaborative research platform in neuroengineering and neuroscience whose outputs will underpin the establishment of a neurotechnology sector in New Zealand based upon the manufacture and global marketing of neurotechnology-based instruments and software. This follows the recognition of a substantial world-wide interest and need for advanced technology and procedures for investigation of the human brain and neurological disorders, in which there are notable gaps in the global neurotechnology market.

The Neurotechnology Programme includes contractual formalization of strong collaborative relationships between the Canterbury District Health Board, the University of Otago, and the University of Canterbury.

Important progress has been made towards meeting longterm objectives in several areas of neurotechnology by development, evaluation, and experimental validation of:

- signal processing techniques for (a) enhancement and detection of epileptic activity (spikes and seizures) in the EEG and (b) detection of drowsiness and lapses in the EEG.
- systems and procedures for off-road assessment and on-road prediction of driving abilities of persons with brain disorders and age-related cognitive decline.
- systems and procedures for measurement of arm/hand and oculomotor functions for investigation of, and prediction of outcome in, neurological disorders.
- computational models of the brain's supreme control system for the planning and execution of arm and eye movements.

3. **Van der Veer Institute for Parkinson's and Brain Research** – A combination of the above strong collaborative neurology/neuroscience/ neurotechnology research platform and substantial ring-fenced funding for Parkinson's disease led to my initiating a proposal for establishing a brain research institute in Christchurch. The proposal was embraced and has gone on to an exciting joint venture spearheaded by the CBRG/CMRF to establish the *Van der Veer Institute for Parkinson's and Brain Research* (www.vanderveer.org.nz) as an inter-institutional and interdisciplinary partnership between the CMRF, UO, UC, and CDHB. In addition to membership of the Establishment Committee, I played a central role in establishing the Institute, particularly re personnel, floor plans, IT, furniture, position description for Director, liaison with stakeholders, and concept of central building plus several research

satellites. I was Chair of the Institute's Executive Management Team until early 2006 when I was appointed Research Director of the Institute's Brain Research Division. The Institute currently has 155 members, comprising 78 Research Personnel (including 42 postgraduate students) and 77 Research Collaborators (local, national, international), nearly all of whom appear on one or more of 98 active research projects (85 in Brain Research Division).

(b) Experience in Applied R&D, contract research, consultancies, patents

1. Applied R&D – Within above areas.
– Director, Christchurch Neurotechnology Research Programme.
2. Contract research – R&D programme on 'Neuroengineering technology and procedures for investigation of the human brain and neurological disorders' funded by FRS1 (July 2000 – present).
3. Consultancies – None.
4. Patents – See Section 11(i)

(c) Research Grants (significant grants only)

Principal investigator –

1979, Accident Compensation Commission, 'Computerised assessment training system', \$24,000, Equipment.

1989, Lottery Medical Research, 'Quantitative techniques and the study of brain dysfunction', \$22,000, Equipment.

1990, Lottery Medical Research, 'Quantitative techniques and the study of brain dysfunction', \$10,000, Salary (N Sharman) and equipment.

1992, Lottery Health Research, 'Quantitative techniques and the study of brain dysfunction', \$35,000, Salaries (S Muir, N Sharman) and equipment.

1993, Lottery Health Research, 'Automated EEG analysis', \$50,000, Salary (A Dingle) and expenses.

1997, Canterbury Medical Research Foundation, 'Automated detection of epileptiform activity in the EEG', \$11,058, Salary (M Black).

2000, Foundation for Research, Science, and Technology (New Economy Research Fund), 'Neuroengineering technology and procedures for investigation of the human brain and neurological disorders', \$500,000 (\$250k pa), Jul 00 – Jun 02.

2002, Foundation for Research, Science, and Technology (New Economy Research Fund), 'Neuroengineering technology and procedures for investigation of the human brain and neurological disorders', \$500,000 (\$250k pa), Jul 02 – Jun 04.

2003, Accident Compensation Corporation, 'Prediction of on-road driving ability through computerized off-road measurement of driving-related functions in patients with brain lesions', \$25,318, Expenses.

2004, Foundation for Research, Science, and Technology (New Economy Research Fund), 'Neurotechnology and procedures for examining and treating the human brain and its

disorders: Detection and prediction of drowsiness and lapses in performance from EEG and eye movements', \$544,000 (\$272k pa), Jul 04 – Jun 06.

2005, Canterbury Medical Research Foundation, 'Prediction of driving ability in persons with brain disorders' and 'Lapses in consciousness - characteristics and countermeasures', : Postdoctoral Research Fellowship (C Innes), \$160,000, Feb 06 – Jan 09.

2006, Wayne Francis Trust, 'Neuroscience & technology research', \$25,000, 1 year.

2006, Foundation for Research, Science, and Technology (New Economy Research Fund), 'Neurotechnology and procedures for examining and treating the human brain and its disorders: Detection and prediction of drowsiness and lapses in performance from EEG and eye movements', 15-month extension, \$340,000, Jul 06 – Sep 07.

2006, Road Safety Trust, 'Refinement and validation of a computerized driving assessment tool for prediction of driving in persons with brain disorders or age-related cognitive decline', \$60,130, 2 years.

2007, Accident Compensation Corporation, Research Career Development Award to Petra Hoggarth (RJ = Primary Supervisor), 'Computerized sensory-motor & cognitive tests for predicting driving ability in older adults', \$85,000, 3 years.

2007, Lottery Health Research, 'Neural bases of lapses of responsiveness: Simultaneous fMRI and EEG', \$99,754, Salary (6 months) & expenses (fMRI scans, etc.).

2007, Transport Research and Educational Trust, 'Objective screening and prediction of safe driving in older drivers through computerized sensory-motor & cognitive tests', \$15,750, Expenses (on-road assessments).

Named contributing researcher –

2002, Canterbury Medical Research Foundation (Cas Van der Veer Parkinsons Research), 'Saccadic sequences in Parkinson's disease', \$29,815, Salary (12 months) & expenses..

2004, Lottery Health Research: 'EEG and Evoked Potentials Laboratory (Neuroscan 2 Desktop Lab)', \$56,218, Equipment.

2004, Canterbury Medical Research Foundation, 'Advanced MR imaging after mild closed head injury'. \$67,488, Salary (12 months) & expenses.

2004, Canterbury Medical Research Foundation, 'Advanced MR imaging after mild closed head injury'. \$67,488, Salary (12 months) & expenses.

2005, Canterbury Medical Research Foundation, 'Mild head injury – use of early oculomotor assessment to predict outcome'. \$58,574, Salary (24 months), equipment, & expenses.

2006, Accident Compensation Corporation, 'Oculomotor markers of postconcussion syndrome', \$26,310, Expenses.

2006, Lottery Health Research, 'High spatio-temporal resolution brain imaging system (Neuroscan Maglink RT)', \$76,319, Equipment.

(d) Supervision of Postgraduate Students

Successfully completed –

PhD, Engineering in brain research: Processing electroencephalograms and chaos in neural networks, Canterbury (Electrical & Electronic Engineering), Alison Dingle (**R Jones**, J Andreae), 1989 – 1993.

ME, Measurement, analysis, and models of finger tapping rates and rhythms in normal and parkinsonian subjects, Canterbury (Electrical & Electronic Engineering), Steven Muir (**R Jones**, J Andreae), 1992 – 1993.

PhD, Advances in zero-based consistent deconvolution and Evaluation of human sensory-motor function, Canterbury (Electrical & Electronic Engineering), Russell Watson (**R Jones**, P Bones), 1990 – 1994.

PhD, Zero-based ensemble deconvolution and EEG spectral topography, Canterbury (Electrical & Electronic Engineering), Brenda Satherley (**P Bones**, **R Jones**), 1992 – 1994.

ME (distinction), A flying-spot laser scanner for tracking eye movements, Canterbury (Electrical & Electronic Engineering), Bruce Wilson (**P Bones**, **R Jones**), 1994 – 1995.

ME, Detection of epileptiform discharges in the electroencephalogram: Real-time processing and Eigenspikes in neural networks, Canterbury (Electrical & Electronic Engineering), Richard Green (**R Jones**, P Bones), 1994 – 1995.

MSc (Hons), Time of day, alcohol and driving-related performance, Canterbury (Psychology), Anne Kerr (**J Dalrymple-Alford**, **R Jones**), 1993 – 1995.

PhD, Automated analysis of the EEG: A neural network approach, Canterbury (Electrical & Electronic Engineering), Christopher James (**R Jones**, P Bones), 1994 – 1997.

PhD, Enhancement of deep epileptiform activity in the electroencephalogram by adaptive spatial filtering, Canterbury (Electrical & Electronic Engineering), Donna-Maree Ward (**R Jones**, P Bones), 1993 – 1998.

MHealSc (distinction), Characteristics of involuntary movements accompanying stuttering and their potential relationship to basal ganglia dysfunction, University of Otago (Medicine), Hilda Mulligan (**T Anderson**, **R Jones**, I Donaldson), 1997 – 1999.

MBA, Investigation into commercialisation of technology for investigation of neurological disorders, Canterbury (Management), Shane Watson (**R Jones**), 1998 – 1999.

ME, Improvements to laser-based measurements of eye movements, Canterbury (Electrical & Electronic Engineering), Kenji Irie (**R Jones**, P Bones), 1998 – 2000.

PhD, Application of time-scale techniques to detection of epileptiform activity in the EEG, Canterbury (Electrical & Electronic Engineering), Hansjerg Goelz (**R Jones**, P Bones), 1997 – 2001.

ME (Practical training), Automated detection of epileptic seizures in the EEG, Twente – The Netherlands (Electrical & Electronic Engineering), Maarten-Jan Hoeve (**R Jones**), 2000 – 2001.

PhD, Computational modelling of the human motor control system – Nonlinear enhancement of the Adaptive Model Theory through simulation and experiment, Canterbury (Electrical & Electronic Engineering), Paul Davidson (**R Jones**, H Sirisena, J Andreae), 1998 – 2001.

PhD, Eye movements as an expression of unconscious processes, University of Otago (Medicine), Michael MacAskill (**T Anderson**, R Jones), 1997 – 2001.

MEM, Commercialisation of Christchurch Neurotechnologies, Canterbury (Electrical & Electronic Engineering), Donny Ling (**R Jones**), 2001 – 2002.

ME, Detecting and classifying epileptic activity in the EEG by independent component analysis, University of Twente (Signals & Systems) [Enschede, The Netherlands], Maarten-Jan Hoeve (**B van der Zwaag**, M. Van Burik, C Slump, R Jones), 2002 – 2003.

ME, Investigation of the human oculomotor control system through simulation and experiment, Canterbury (Electrical & Electronic Engineering), Johnny Tan (**R Jones**, H Sirisena, T Anderson), 2001 – 2003.

PhD, Motor deficits and recovery following mild closed head injury – Contribution of computerized motor testing to patient assessment and outcome prediction, University of Otago (Medicine), Marcus Heitger (**T Anderson**, R Jones), 1999 – 2005.

PhD, Prediction of driving ability via computerized sensory-motor and cognitive tests in persons with brain disorders, University of Otago (Medicine), Carrie Innes (**R Jones**, T Anderson, J Dalrymple-Alford), 2002 – 2005.

PhD, The coordination of breathing and swallowing across the human lifespan: Implications for neural control, University of Canterbury (Communication Disorders), Bronwen Kelly (**M Huckabee**, R Jones), 2003 – 2006.

PhD, Behavioural microsleeps: Characteristics and detection from the EEG, University of Canterbury (Electrical & Computer Engineering), Malik Peiris (**R Jones**, P Bones), 2001 – 2008.

In progress –

PhD, Investigations into motor adaptation and Parkinson's disease using virtual reality and computational models, University of Otago (Medicine), Daniel Myall (**R Jones**, T Anderson), 2002 – present.

ME, Video-based metrics in detection of drowsiness, sleep, and behavioural microsleeps, University of Canterbury (Electrical & Computer Engineering), Amol Malla (**R Jones**, P Bones, R Green, P Davidson), 2005 – present.

PhD, Investigation of mechanisms of lapses in responsiveness via simultaneous functional-MRI and EEG, University of Otago (Medicine), Govinda Poudel (**R Jones**, C Innes, P Bones), 2006 – present.

PhD, Factors associated with driving in healthy older adults and those with cognitive impairment of the Alzheimer's type, University of Canterbury (Psychology), Petra Hoggarth (**R Jones**, Carrie Innes, John Dalrymple-Alford), 2007 – present.

PhD, Effects of dysphagia rehabilitation techniques on the neural control of swallowing: Investigations by motor evoked potentials and the Bereitschaftspotential, University of Canterbury (Communication Disorders), Phoebe Macrae (**M Huckabee**, R Jones), 2007 – present.

PhD, Effects of olfaction and gustation on the neural substrates of swallowing: Investigations by motor evoked potentials and the Bereitschaftspotential, University of Canterbury (Communication Disorders), Norsila Abdul Wahab (**M Huckabee**, R Jones), 2007 – present.

8. Distinctions

Fellowships / Senior Memberships –

Senior Membership of Institution of Electrical and Electronic Engineers (SMIEEE), 1990.

Fellowship of Australasian College of Physical Scientists and Engineers in Medicine (FACPSEM), 1995.

Fellowship of Institution of Professional Engineers, New Zealand (FIPENZ), 1999.

Fellowship of American Institution for Medical and Biological Engineering (FAIMBE), 2003.

Fellow of Institute of Physics (UK) (FInstP), 2004.

Prizes/Awards –

Boyce Worthley prize for *Distinction in the practice of the physical sciences or engineering in medicine*, Australasian College of Physical Scientists and Engineers in Medicine, 1989.

Medical Researcher Interchange Award (Spastic Centre Research Unit at Prince Henry Hospital / University of New South Wales, Sydney for study of *Adaptive Model Theory - a computational model of information processing performed by the central nervous system in control of voluntary movement*, Canterbury Medical Research Foundation, 1992.

Primary Supervisor of Amanda White, first equal winner of Canterbury Medical Research Foundation Prize for best abstract in 1994/5 Summer Studentships on 'Eye-arm performance in developmental stutterers', 1995.

Primary Supervisor of Carrie Innes, winner of George Rolleston Prize for best scientific report in 2001/2 Summer Studentships Research Programme on 'Computerized measurement of driving-related cognitive functions in patients with brain lesions', 2002.

Co-Supervisor of Bronwen Kelly, winner of Goddard Prize for best student presentation at *22nd International Australasian Winter Conference on Brain Research* on 'Cortical influences over infantile breathing-swallowing coordination', 2004.

Primary Supervisor of Malik Peiris, judged CMRS Young Researcher of the Year for 2004 on his presentation 'Lapses of consciousness during a continuous tracking task', 2005.

Co-Supervisor of Bronwen Kelly, joint winner of Best Student Presentation at *Canterbury Health Research Conference 2005* on 'Coordinating respiration and nutritive swallowing in the first year of life', 2005.

Wayne Francis Research Fellowship for *Contributions to brain research*, 2006.

Leader of team awarded 'Runner-up' in the Canterbury District Health Board's 2006 *Quality and Innovation Awards* (Clinical/Diagnostic; Hospital & Specialist Service Category) for 'Canterbury Driving Assessment Tool (*CanDAT*TM) – Increasing the safety and accuracy of driving assessment of people with brain disorders', 2006.

Primary Supervisor of Petra Hoggarth, awarded prize for best presentation in Department of Psychology's Post-graduate conference (University of Canterbury) on 'Computerized sensory-motor & cognitive tests for predicting driving ability in older adults', 2007.

Winner of the 2007 *Transport Research and Educational Trust Board Award* for project 'Objective screening and prediction of safe driving in older drivers through computerized sensory-motor & cognitive tests'.

Notable Posts (see also Section 13) –

Professional Advisor to Canterbury Area Health Board on Medical Physics and Biomedical Engineering, 1991 – 1994.

Member of Administrative Committee of *IEEE Engineering in Medicine and Biology Society* (Representative elected by and for Asia/Pacific Region – covering half of world's population), 1993 – 1994.

President of *Australasian College of Physical Scientists and Engineers in Medicine*, 1996 – 1997.

Associate Editor and Member of Editorial Board of *IEEE Transactions on Biomedical Engineering*, 1996 – 2001.

Co-Chair of Theme on 'Neural Systems and Engineering' of *23rd International Conference of IEEE Engineering in Medicine and Biology Society*, Istanbul, 2001.

Member of Editorial Board of *Journal of Neural Engineering*, 2003-present.

Co-Chair of Theme on 'Neural Systems and Engineering' of *27th International Conference of IEEE Engineering in Medicine and Biology Society*, Shanghai, 2005.

Associate Editor and Member of Editorial Board of *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 2006 – present.

Member of Technical Committee on Neural Engineering of the *IEEE Engineering in Medicine and Biology Society*, 2006-present.

Theme Editor on Conference Editorial Board of *IEEE Engineering in Medicine and Biology Society* with co-responsibility for 'Neural Engineering, Neuromuscular Systems & Rehabilitation Engineering', 2008-2011.

Co-Chair of Theme on 'Neural Engineering, Neuromuscular Systems & Rehabilitation Engineering', Member of International Program Committee, and Associate Editor of

Student Paper Competition of *30th International Conference of IEEE Engineering in Medicine and Biology Society*, Vancouver, 2008.

Member of International Committee of *5th International Conference on Information Technology and Applications in Biomedicine (ITAB 08)*, Shenzhen, China, 2008.

Notable Recognitions –

Recognition of 'Motor Control and Movement Disorders Research Programme' as an *Area of Research Excellence* (Leaders = RD Jones, TJ Anderson, and IM Donaldson), University of Otago, 1998.

Recognition of 'EEG Research & Development Programme' recognized as an *Area of Research Excellence* (Leader = RD Jones), University of Otago, 1998.

9. Teaching Activities

Supervision of postgraduate students –

Individual supervision/mentoring of postgraduate students is essentially my sole – but very substantial and successful – teaching activity; see 7(d).

Lectures in formal courses –

'Electrical inspection of the human nervous system', Extended lecture in ENEL 514/614 course on Biomedical Engineering, University of Canterbury (Electrical & Electronic Engineering), 1998 – 2001.

'Measurement of sensory-motor dysfunction in neurological disorders', Extended lecture in ENEL 514/614 course on Biomedical Engineering, University of Canterbury (Electrical & Electronic Engineering), 1998 – 2001.

'Neurophysiology at Christchurch Hospital: clinical procedures and R&D activities', Extended lecture ZOOL 458 on Neurobiology, University of Canterbury, 2000.

'Van der Veer Institute – Overview, Labs, and R&D activities', Extended visit by final year class in Neurobiology, Zoology Department, University of Canterbury, 2005.

Post-graduate/continuing education programmes –

Inservice Education Programme, Christchurch Hospital (Medical Physics & Bioengineering), 1979 – present.

Neurosciences Education Programme, Christchurch Hospital (Neurology), 1979 – 2004

Post-graduate Seminar Programme, University of Canterbury (Electrical & Electronic Engineering), 1989 – present.

Research Discussion Group, Van der Veer Institute, 2005 – present.

Continuing professional development lectures at conferences –

'Detection and enhancement of epileptic activity in the EEG', *Engineering and Physical Sciences in Medicine 2002*, Rotorua, November 2002.

10. Publications

Key: **Bold** = Principal Author; Underlined = Principal Investigator
Impact factors = 2006

(a) Books

Theses –

Jones, R.D. (1987). *Measurement of normal and abnormal sensory-motor function by a computerized test battery*. Doctoral Dissertation (Medicine), University of Otago, Dunedin, New Zealand, 257p.

Jones, R.D. (1975). *Evaluation and training of vehicle-driving abilities of outgoing hospital patients*. Masters Thesis (Electrical & Electronic Engineering); University of Canterbury, Christchurch, New Zealand, 253p.

(b) Book Chapters

Jones, R.D. (2006). Measurement of sensory-motor control performance capacities: Tracking tasks. In J.D. Bronzino (Ed.), *The Biomedical Engineering Handbook – Biomedical Engineering Fundamentals* (3rd ed., pp. 77: 1-25). Boca Raton, Florida, CRC Press.

Jones, R.D. (2000). Measurement of sensory-motor control performance capacities: Tracking tasks. In J.D. Bronzino (Ed.), *The Biomedical Engineering Handbook*. (Section XIV on Human Performance Engineering), (2nd ed., pp.149: 1-25). Boca Raton, Florida, CRC Press.

Laxminarayan, S., Bronzino, J.D., Bencken, J.E.W., Usai, S., & Jones, R.D. (1995). The role of professional societies in biomedical engineering. In J.D. Bronzino (Ed.), *The Biomedical Engineering Handbook*. (Section XIX on Regulations and Organizations), (pp. 2787-2793). Boca Raton, Florida, CRC Press.

Jones, R.D. (1995). Measurement of sensory-motor control performance capacities. In J.D. Bronzino (Ed.), *The Biomedical Engineering Handbook*. (Section XIV on Human Performance Engineering), (pp. 2187-2208). Boca Raton, Florida, CRC Press.

(c) Refereed Journal Articles

Full Papers –

Van Hese, P., Vanrumste, B., Hallez, H., Carroll, G.J., Vonck, K., Jones, R.D., Bones, P.J., D'Asseler, Y., Lemahieu, I. (2008). Detection of focal epileptiform events in the EEG by spatio-temporal dipole clustering. *Clinical Neurophysiology*, 119, 1756-1770.

[IF = 2.718]

Myall, D.J., MacAskill, M.R., Davidson, P.R., Anderson, T.J., Jones, R.D. (2008). Design of a modular and low-latency virtual-environment platform for applications in motor adaptation research, neurological disorders, and neurorehabilitation. *IEEE Transactions on Neural Systems and Rehabilitation Engineering*, 16, 298-309.

[IF = 1.842]

- Kelly, B.N., Huckabee, M.L., Frampton, C.M.A., Jones, R.D.** (2008). Arousal has no effect on non-nutritive breathing-swallowing coordination during the first year of human life. *International Journal of Developmental Neuroscience*, 26, 385-390. [IF = 2.924]
- Kelly, B.N., Huckabee, M.L., Jones, R.D., & Carroll, G.J.** (2007). The Influence of volition on breathing-swallowing coordination in healthy adults. *Behavioral Neuroscience*, 121(6), 1174-1179. [IF = 2.907]
- Kelly, B.N., Huckabee, M.L., Jones, R.D., & Frampton, C.M.A.** (2007). Integrating swallowing and respiration: Preliminary results of the effect of body position. *Journal of Medical Speech-Language Pathology*, 15(4), 347-355. [IF = 0.544]
- Heitger, M.H., Jones, R.D., Frampton, C.M., Ardagh, M.W., & Anderson, T.J.** (2007). Recovery in the first year after mild head injury: Divergence of symptom status and self-perceived quality of life. *Journal of Rehabilitation Medicine*, 39, 612-621. [IF = 2.168]
- Innes, C.R.H., Jones, R.D., Dalrymple-Alford, J.C., Hayes, S., Hollobon, S., Severinsen, J., Smith, G., Nicholls, A., & Anderson, T.J.** (2007). Computerized sensory-motor and cognitive tests can predict the driving ability of persons with brain disorders. *Journal of Neurological Sciences*, 260, 188-198. [IF = 2.412]
- Davidson, P.R., Jones, R.D., & Peiris, M.T.R.** (2007). EEG-based behavioral microsleep detection with high temporal resolution. *IEEE Transactions on Biomedical Engineering*, 54, 832-839. [IF = 2.302]
- Kelly, B.N., Huckabee, M.L., Jones, R.D., & Frampton, C.M.A.** (2007). The first year of human life: coordinating respiration and nutritive swallowing. *Dysphagia*, 22, 37-43. [IF = 1.000]
- Kelly, B.N., Huckabee, M.L., Jones, R.D., & Frampton, C.M.A.** (2007). The early impact of feeding on human infantile breathing-swallowing coordination. *Respiratory Physiology & Neurobiology*, 156, 147-153. [IF = 2.049]
- Heitger, M.H., Jones, R.D., Dalrymple-Alford, J.C., Frampton, C.M., Ardagh, M.W., & Anderson, T.J.** (2007). Mild head injury – a close relationship between motor function at one week post-injury and overall recovery at three and six months. *Journal of Neurological Sciences*, 253, 34-47. [IF = 2.412]
- Peiris, M.T.R., Jones, R.D., Davidson, P.R., Carroll, G.J., & Bones, P.J.** (2006). Frequent lapses of responsiveness during an extended visuomotor tracking task in non-sleep-deprived subjects. *Journal of Sleep Research*, 15, 291-300. [IF = 3.458]
- Kelly, B.N., Huckabee, M.L., Jones, R.D., & Frampton, C.M.A.** (2006). Nutritive and non-nutritive swallowing apnea duration in term infants: implications for neural control mechanisms. *Respiratory Physiology & Neurobiology*, 154, 372-378. [IF = 2.049]
- Heitger, M.H., Jones, R.D., Dalrymple-Alford, J.C., Frampton, C.M., Ardagh, M.W., & Anderson, T.J.** (2006). Motor deficits and recovery during the first year following mild closed head injury. *Brain Injury*, 20, 807-824. [IF = 1.182]
- Vanrumste, B., Jones, R.D., Bones, P.J., & Carroll, G.J.** (2005). Slow-wave activity arising from the same area as epileptiform activity in the EEG of paediatric patients with focal epilepsy. *Clinical Neurophysiology*, 116, 9-17. [IF = 2.718]

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- Heitger, M.H.**, Anderson, T.J., Jones, R.D., Dalrymple-Alford, J.C., Frampton, C.M., & Ardagh, M.W. (2004). Eye movement and visuomotor arm movement deficits following mild closed head injury. *Brain*, 127, 575-590. [IF = 7.617]
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- MacAskill, M.R.**, Anderson, T.J., & Jones, R.D. (2002). Saccadic adaptation in neurological disorders. *Progress in Brain Research*, 140, 419-433. [IF = 2.872]
- Heitger, M.H.**, Anderson, T.J., & Jones, R.D. (2002). Saccadic sequences as a marker of deficits in closed head injury. *Progress in Brain Research*, 140, 433-448. [IF = 2.872]
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- Muir, S.R., Jones, R.D., Andrae, J.H. & Donaldson, I.M. (1995). Measurement and analysis of single and multiple finger tapping in normal and Parkinsonian subjects. *Parkinsonism & Related Disorders*, 1, 89-96. [IF = 2.308]

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Jones, R.D. (1983). The effectiveness of rehabilitation on recovery from brain damage: A literature review. *New Zealand Journal of Physiotherapy*, 11, 34-36. [IF = -]

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Full Papers in revision -

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Full Papers submitted -

Published Abstracts -

Kelly, B.N., **Huckabee, M.-L.**, Jones, R.D., & Carroll, G.J. (2007). Breathing-swallowing coordination in healthy adults: the role of cortical modulation. *Dysphagia*, 22, 371.

Peiris, M.T.R., **Jones, R.D.**, Davidson, P.R., Bones, P.J. (2007). Detection of lapses of responsiveness from spectral and non-linear features in the EEG. (Abstract). *Sleep and Biological Rhythms*, 5, Supp. 1, A40.

Davidson, P.R., **Jones, R.D.** (2007). EEG spectral dynamics for lapse detection. (Abstract). *Sleep and Biological Rhythms*, 5, Supp. 1, A39.

Norrie, J., Heitger, M., **Leathem, J.**, Anderson, T., & Jones, R.D. (2007). Mild traumatic brain injury and fatigue: Preliminary findings from a longitudinal prospective study. *The Clinical Neuropsychologist*, 21, 410.

Kelly, B.N., **Huckabee, M.-L.**, Jones, R.D., & Frampton, C.M. (2006). The neural implications of nutritive and non-nutritive swallowing apnea duration in term infants. *New Zealand Journal of Speech-Language Therapy*, 61, 52

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(h) Other Significant Conference Involvement

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(I) Patents

Jones, R.D., & Pollock, T.S. (May 2007). Symbols-scanning test and symbols-and-tracking dual-task test. Australian patent 2003281274 (effective 4 Jul 2003).

Innes, C.I., & Jones R.D. (Apr 2006). Test on visual search. New Zealand patent 535398.

Davidson, P.R., & Jones, R.D. (Nov 2005) Apparatus for monitoring physiological data for detecting and predicting lapse events. Provisional patent 543851, NZ Patents Office.

Innes, C.I., & Jones, R.D. (Sep 2005). Test on visual search. International patent application PCT/NZ2005/000242.

Davidson, P.R., & Jones, R.D. (Aug 2005). Method of training or validating a lapse detection system'. Provisional patent 542069, NZ Patents Office.

Jones, R.D., & Pollock, T.S. (Dec 2004). Symbols-scanning test and symbols-and-tracking dual-task test. Application 10/519,740 for US patent.

Jones, R.D. (March 2002). Trademark on 'SMTTests'.

11. University Service (not listed elsewhere)

(a) Positions held within Department/School/Division

Higher Degrees Committee, Department of Medicine, Christchurch School of Medicine & Health Sciences, 1999-present.

Website Advisory Committee, Christchurch School of Medicine & Health Sciences, 2000-2005.

(b) Positions held at a University level

None

(c) Positions held as a University representative at National level

None

12. Professional Activities

(a) Academic and Professional Advice and Services

(ii) Service to non-government organisations

Scientific Advisory Committee, Canterbury Medical Research Foundation 2002-present.

(b) Service to External Academic and Professional Activities

(i) Service to, or leadership in, academic discipline or professional organisations

Positions held in Professional Organisations/Associations –

Australasian College of Physical Scientists in Medicine, Education Committee (NZ Representative), 1981-1985.

Christchurch Medical Research Society, Committee, 1983-1985.

Christchurch Medical Research Society, Secretary and Treasurer, 1985-1987.

Medical and Biological Engineering Society (Canterbury), Committee, 1986-1989.

Australasian College of Physical Scientists in Medicine (NZ Branch), Spokesman on Neurology, 1987-present.

Australasian College of Physical Scientists in Medicine (NZ Branch), Vice-Chairman, 1991-1992.

IEEE Engineering in Medicine and Biology Society, International Activities Committee, 1992-1996.

IEEE Engineering in Medicine and Biology Society, Chair of Distinguished Lecturer Program Committee, 1993.

IEEE Engineering in Medicine and Biology Society, Co-Chair of International Activities Committee, 1993.

IEEE Engineering in Medicine and Biology Society, Administrative Committee (Elected Representative for Asia/Pacific Region), 1993-1994.

Australasian College of Physical Scientists in Medicine (NZ Branch), Chairman, 1993-1994.

IEEE Engineering in Medicine and Biology Society, Member & Chapter Activities Committee, 1993-1994.

Australasian College of Physical Scientists and Engineers in Medicine, Vice-President, 1993-1995.

Australasian College of Physical Scientists and Engineers in Medicine, President, 1996-1997.

Australasian College of Physical Scientists and Engineers in Medicine, Immediate Past President (Member of Executive), 1998-1999.

IEEE Engineering in Medicine and Biology Society, Ethics and Professional Responsibility Committee, 1998.

IEEE Engineering in Medicine and Biology Society, Nominating Committee, 1998-1999.

Christchurch Movement Disorders and Brain Research Group, Secretary and a Founding Member, 1998-2001.

Innovative Healthcare Technologies Group (NZ), Establishment Committee and Executive, 1999-2001.

Christchurch Brain Research Group (www.cbmg.ac.nz), Chair & Administrator, 2001-2004.

IEEE Engineering in Medicine and Biology Society, Technical Committee on Neural Engineering, 2006-present.

Academic Examiner –

University of Otago, Department of Physics, MSc (Medical Physics), 'The visual evoked response: Development of a clinical protocol', 1991.

University of Auckland, Department of Computer Science, MSc (Computer Science), 'Towards the development of a robotic reaching aid using a modular robot control and simulation environment', 1992.

University of Auckland, Department of Engineering Science, ME, 'Modelling the auditory brainstem response using an anatomically accurate model of the human head' (Harris), 1996.

University of New South Wales, Graduate School of Biomedical Engineering, PhD, 'Modelling of the nervous system during human purposive movement' (Vahdat), 1997.

University of New South Wales, School of Electrical Engineering, ME, 'Mathematical modelling of the human operator control system through tracking tasks' (Sriharan), 1997.

University of Canterbury, Department of Electrical & Electronic Engineering, ME, 'A biological approach to auditory signal processing' (Jordan), 1999.

University of Waikato, Department of Physics and Electronic Engineering, PhD [including oral], 'The auditory evoked response as an indicator of stress in free-ranging animals' (Harris), 1999.

University of Otago, Department of Physical Education, PhD, 'H-reflex modulation during backward-to-forward stepping' (Handcock), 2003.

University College Dublin, Department of Electronic and Electrical Engineering, PhD [including oral via video-conference], 'Electrophysiological studies of the human attention system with application to brain computer interfacing' (Kelly), 2005.

University of Southampton, Faculty of Engineering, Science and Mathematics, External Assessor, 2005.

University of New South Wales, School of Electrical & Telecommunications Engineering, PhD, 'Engineering and computational modeling of adaptive nonlinear internal models formed by central nervous system: An approach based on adaptive filters and nonlinear system modeling and identification' (Ghous), 2006.

Referee for Research Funding Organisations –

Engineering and Physical Sciences Research Council (UK) – 2002, 2003, 2005.

Foundation for Research, Science & Technology (NZ) – 2003.

Health Research Council (NZ) – 1988.

Israel Science Foundation – 2000.

Italian Ministry for Education University and Research – 2004.

Lottery Health Research (NZ) – 2001, 2002 (2x), 2006.

Massey University Research Committee – 2005.

National Health and Medical Research Council, Australia – 1994, 1995.

Neurological Foundation of New Zealand – 1998.

Ramaciotti Foundations of Australia – 1999.

Reviewer for Scientific Journals & Book Publishers –

Australasian Physical & Engineering Sciences in Medicine (10 manuscripts – 1993 (2x), 1994, 1996, 1997, 1998, 2002, 2003 (2x)).

Chronobiology International (1 manuscript – 2008).

Encyclopedia of Biomedical Engineering [Wiley] (1 chapter – 2005).

Experimental Brain Research (1 manuscript – 2005).

Human Movement Science (3 manuscripts – 1991, 1995, 2002).

IEEE Engineering in Medicine and Biology Magazine (2 manuscripts – 2004, 2006).

IEEE Press (book proposal – 2007)

IEEE Transactions on Rehabilitation Engineering (1 manuscript – 1994).

IEEE Transactions on Biomedical Engineering (9 manuscripts – 1999, 2000, 2001 (2x), 2002 (3x), 2003 (2x), 2004, 2005).

IEEE Transactions on Neural Systems & Rehabilitation Engineering (3 manuscripts – 2005, 2006, 2007 (2x)).

Journal of Neural Engineering (1 manuscript – 2005).

Journal of Neuroscience Methods (1 manuscript – 2003).

Medical & Biological Engineering & Computing (1 manuscript – 2000).

NeuroImage (1 manuscript – 2007).

Conference Organisation –

Annual International Conferences of IEEE Engineering in Medicine and Biology Society, International Conference Committee, 1988-2006.

IEEE Engineering in Medicine and Biology Society, Conferences Committee, 1994-1996.

IEEE Engineering in Medicine and Biology Society, Regional Conferences Committee, 1994-1997.

Engineering and Physics in Medicine Conference '95, Queenstown, NZ, Organising Committee and *3rd Asia/Pacific Regional Conference of the IEEE Engineering in Medicine and Biology Society*, Queenstown, NZ, Convenor, 1995.

20th International Conferences of IEEE Engineering in Medicine and Biology Society, Hong Kong, Co-Chair of Track on 'Wavelets/Time-Frequency Analysis', 1998.

1st Joint Annual Conference of Medical Engineering Society (BMES) and IEEE Engineering in Medicine & Biology Society (EMBS), Atlanta, USA, Co-Chair of Track on 'Nonstationary Signal Processing: Time-Frequency and Time-Scale', 1999.

World Congress on Medical Physics & Biomedical Engineering – 2000, Chicago, USA, International Advisory Committee, 2000.

IEEE-EMBS Asia-Pacific Conference on Biomedical Engineering, Hanzghou, China, International Program Committee, 2000.

23rd International Conference of IEEE Engineering in Medicine and Biology Society, Istanbul, Turkey, Co-Chair of Theme on 'Neural Systems and Engineering' and Chair of Track on 'Clinical Neural Engineering' and Organizer/Chair of Special Session on 'Component analysis and brain signals', 2001.

1st IEEE EMBS Neural Engineering Special Topic Conference, Capri, Italy, Member of Technical Program Committee, 2003.

25th International Conference of IEEE Engineering in Medicine and Biology Society, Cancun, Mexico, Chair of Track on 'Clinical Neural Engineering', 2003.

26th International Conference of IEEE Engineering in Medicine and Biology Society, San Francisco, USA, Chair of Track on 'Neurophysiology and Clinical Applications' in Neural & Rehabilitation Engineering Theme, 2004.

2nd IEEE EMBS Neural Engineering Special Topic Conference, Arlington, VA, USA, Member of Technical Program Committee, Judge for Neural Engineering Award, 2004-2005.

27th International Conference of IEEE Engineering in Medicine and Biology Society, Shanghai, China: Co-Chair of Theme on 'Neural Systems and Engineering', Member of International Program Committee, Chair of Track on 'Clinical Neurophysiology and Neuro-engineering', Chair of Track on 'Human Performance – Normal Function and Neurological Disorders', Chair & Organizer of Special Session on 'Early and differential diagnosis of neurological & neuropsychiatric disorders', Chair & Organizer of Special Session on 'The wake-sleep continuum - Behavioral & physiological', Co-Chair of Special Session on 'Epilepsy', 2004-2005.

28th International Conference of IEEE Engineering in Medicine and Biology Society, New York, USA, Member of International Program Committee, Chair of Track on 'New techniques in rehabilitation', Co-Chair of Session on 'New techniques in rehabilitation', Reviewer and Judge in Student Paper Competition, 2006.

30th International Conference of IEEE Engineering in Medicine and Biology Society (20-24 August 2008), Vancouver, Canada: Co-Chair of Theme on 'Neural Engineering, Neuromuscular Systems & Rehabilitation Engineering' + Member of International Program Committee, 2008.

5th International Conference on Information Technology and Applications in Biomedicine (30-31 May 2008), Shenzhen, China: Member of International Committee, 2008

Judge –

18th International Conferences of IEEE Engineering in Medicine and Biology Society, Amsterdam, The Netherlands, Panel of judges for IEEE/EMBS Whitaker Foundation Student Design Competition, 1996.

Christchurch Medical Research Society, Co-Judge of Young Researcher Prize, 2001-present.

23rd International Conference of IEEE Engineering in Medicine and Biology Society, Istanbul, Turkey, Member of panel of judges for 2001 IEEE/EMBS Whitaker Foundation Student Paper Competition, 2001.

Engineering and Physical Sciences in Medicine 2002, Rotorua, NZ, Member of Scientific Committee and Co-Judge of Poster Competition, 2002.

25th International Conference of IEEE Engineering in Medicine and Biology Society, Cancun, Mexico, Student paper judge, 2003.

2nd IEEE/EMBS International Special Topic Conference on Neural Engineering, Arlington, VA, Member of panel of judges for Neural Engineering Awards, 2005.

28th International Conference of IEEE Engineering in Medicine and Biology Society, New York, Student paper judge, 2006.

Manuals for Professional Organisations –

'Distinguished Lecturer Program: Guidelines' for IEEE Engineering in Medicine and Biology Society, 1993.

'Procedures for development of ACPSEM projects' for Australasian College of Physical Scientists and Engineers in Medicine, 1996.

'Guidelines for Overseeing EPSM Conferences by the Joint Colleges Executive', for Joint Colleges Executive of Australasian College of Physical Scientists and Engineers in Medicine and College of Biomedical Engineers, IE(Aust), 1997.

'Duties and Guidelines for Officers of ACPSEM', for Australasian College of Physical Scientists and Engineers in Medicine, 1997.

(ii) Editorship of journals and periodicals

IEEE Transactions on Biomedical Engineering, Associate Editor and Member of Editorial Board, 1996-2001.

Journal of Neural Engineering, Member of Editorial Board, 2003-present.

IEEE Transactions on Neural Systems and Rehabilitation Engineering, Associate Editor and Member of Editorial Board, 2006-present.

13. Community Service

(a) Continuing Education, Community Debate and Community Development

(i) Media commentaries and columns on professional matters

Interview by Ainslie Talbot on *Canterbury Healthline*, 'Neurotechnology Research and Development Programme', Plains FM, Christchurch, 2000.

Article in *The Press*, 'Funding boost for brain researchers', Christchurch, 26 June 2001.

Media Release, 'World-first research links stuttering to brain dysfunction', CSMHS (Ainslie Talbot), Christchurch, 26 Sept 2002.

Interview by Linda Clark on *Nine-to-Noon*, 'World-first research links stuttering to brain dysfunction', National Radio, New Zealand, 2 Oct 2002.

Item on *Midday Report*, 'World-first research links stuttering to brain dysfunction', National Radio, New Zealand, 2 Oct 2002.

Item in *Chronicle*, 'Health Board selects UC commercialisation company to help raise extra revenue', University of Canterbury, Christchurch, 7 Oct 2004.

Item on News on One, 'Driving assessment service at Burwood Hospital: World-leading off-road assessment system and commercialisation prospects', Television One, New Zealand, 31 Oct 2004.

Article in *The National Business Review* (page 46) on 'Health Board selects UC commercialisation company to help raise extra revenue', 11 Nov 2004.

Article in *The Press*, 'Catching sleep at the wheel', Christchurch, 24 Nov 2004.

Cartoon (Al Nisbet) in *The Press*, 'Drowsy driver alert monitor on production line soon?', Christchurch, 24 Nov 2004.

Interview (at EMBC'05 in Shanghai on 2 Sept 05) by Japan Broadcasting Corporation (NHK) for documentary on "Cyborg – Developments & future directions in neural engineering"; on national Japan Television on 5 Nov 2005.

Interviews on EEG & Research for Science Education Learning Hub project (funded by MORST) for secondary schools, 'EEG and epilepsy' + 'Mini-sleep experiment' + 'Measuring microsleeps with EEG' + 'EEG and MRI', 6 June 2007.
www.sciencelearn.org.nz/contexts/see_through_body/sci_media

Interview on Newstalk ZB (Dunedin) re Driving Research Programme, 16 Jan 2008.

Interview on Newstalk ZB (nationwide) re Driving Research Programme, 5 Feb 2008.

Interview on Radio New Zealand (nationwide) re Driving Research Programme, 7 Feb 2008.

Article in Wairarapa News, 'Device to test older people's ability to drive', Masterton, 13 Feb 2008

Article in Herald on Sunday, 'Test for older drivers', Auckland, 17 Feb 2008.

Article in Marlborough Express, 'AA Report: New tool for older person assessment being developed', 28 Feb 08

Article in Community News, 'Institute wins award [Transport Research and Educational Trust Board]', Christchurch, 2 Mar 2008.

Article in Hastings Mail, 'Researchers test driver ability', Hastings, 12 Mar 2008.

Photo in The Press, 'Simultaneous-fMRI&EEG investigation of microsleeps', Christchurch, 19 Mar 2008.

Article in The Press, 'Microsleeps: Safety study could help save lives', Christchurch, 24 Mar 2008.

Feature (including interview), on TV ONE's *Close Up*, 'Microsleeps' – based upon our world-first functional image of what happens in the brain during a microsleep (via simultaneous-fMRI+EEG+Tracking+EyeMovements), 14 Apr 2008.
http://tvnzondemand.co.nz/content/close_up_2007/ondemand_video_skin?tab=&sb=date-descending&e=close_up_2008_04_14#sp_close_up_2008_04_14

Interview in CTV's new series on "The Body, The Research and The Professor" on, 19 Jun 2008 – focus on the brain (4 screenings).

(iii) Public lectures

Medical Research EXPO, 'New methods in treatment of stroke', Christchurch Town Hall, 1994.

Royal Society (Canterbury Branch), 'Neurotechnology Research and Development in Christchurch', Christchurch, May 2003.

Older Drivers Briefing for Pegasus GPs, 'Driving assessment research study' (co-presented with Carrie Innes), Christchurch, June 2004.

Ministry of Transport, 'Brain Research and Christchurch Neurotechnology Research Programme', Wellington, Aug 2006. [Talk to MOT, ACC, LTNZ, and other government & non-government organisations].

(iv) Provision of continuing education

Issues Gallery, 'Sensory-motor system' and 'EEG', Science Alive, Christchurch, 1996.

(e) Other Examples of Community Service

Talks, tours, and demos to community groups and other visitors to *Van der Veer Institute for Parkinson's and Brain Research*.

- Christchurch Lawyers Association – 18 Aug 2004
- CMRF Founding Members – 15 Sep 2004
- Community Service Clubs (Zonta, Lions, Rotary) – 3 Nov 2004
- MPs (Ruth Dyson, Lianne Dalziel, Clayton Cosgrove) – Nov 2004
- MPs (Gerry Brownlie, Brian Connelly) – 15 Dec 2004
- MP (Tim Barnett) – Feb 2005
- Pegasus Lions – 9 Feb 2005

- MP (Linda Scott) – 14 Mar 2005
- Christchurch South Lions – 28 Apr 2005
- Kiwanis Club – 5 May 2005
- CMRF Lawyers/Trust Luncheon – 24 May 2005
- Christchurch North Lions – 27 July 2005
- Christchurch Motor Neurone Disease Support Society – 25 Sept 2005
- Altrusa International of Christchurch Inc. (Altrusa Club) – 21 Feb 2006
- CEO of CDHB (Gordon Davies) – 11 Apr 2006
- *Institute of Directors* – 23 May 2006
- CMRF Executive and Invitees – 13 Mar 2007
- Neurological Foundation – 12 Apr 2007
- CMRF Lawyers/Trust Evening 'Brain Imaging' – 31 May 2007
- New Zealand Society of Neurophysiology Technicians – Talk + Tour – 2 Nov 2007
- Ethics Committees – Upper South A & B – Talk + Tour – 23 Jun 2008

Technical Advisor to (successful) Eastern Christchurch Anti-pylon Action Group, including formal presentation at a Special Meeting of the Christchurch City Council, 1982-1983.

